LIVERMORE LAB
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory Feb. 24-28, 2014.

TIME
Science & Space

ASHES IN THE SKY

LLNL scientist Benjamin Santer and his climbing group ascend Mount St. Helens in April 1980, about a month before its eruption. The group was the last to reach the summit of Mount St. Helens before its major eruption that May. New research by Santer and his colleagues shows that volcanic eruptions contribute to a recent warming "hiatus."

Volcanic eruptions in the early part of the 21st century have cooled the planet and partly offset the warming produced by greenhouse gases, according to a new report by Lawrence Livermore scientists.

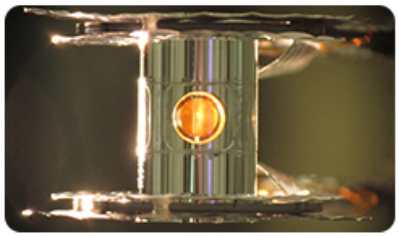
Despite continuing increases in atmospheric levels of greenhouse gases, and in the total heat content of the ocean, global-mean temperatures at the surface of the planet and in the troposphere (the lowest portion of the Earth's atmosphere) have shown relatively little warming since 1998.

Research shows that large volcanic eruptions inject sulfur dioxide gas into the stratosphere. The gas forms tiny droplets of sulfuric acid, also known as "volcanic aerosols," that can block sunlight.

"The hiatus is a fascinating detective story," says Benjamin Santer, the lead author of the study and an atmospheric scientist at Lawrence Livermore. "What we show is that even without any computer model calculations, there is a clear signal of these early volcanic activity having effects on temperatures and on the reflected sunlight of the atmosphere."

To read more, go to *Time Magazine*.

POPULAR SCIENCE IN SEARCH OF . . .



A metallic case called a hohlraum holds the fuel capsule for National Ignition Facility (NIF) experiments. Researchers recently have created more energy at NIF than was absorbed by the fuel.

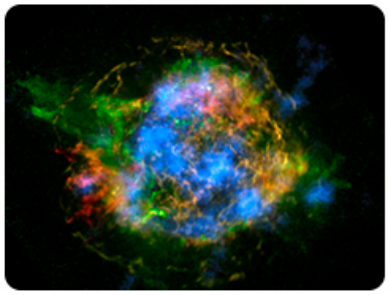
U.S. physicists are reporting they've achieved fuel gain, where more energy is released than was absorbed by the fuel.

Fusion is the reaction that occurs in the interiors of stars, including Earth's sun. In more than 50 years of research, scientists have been unable to get more energy out of fusion than they put in.

That's still an elusive goal. The recent experiments, done at the National Ignition Facility, created something on the order of 1 percent of the energy physicists put into them.

To read more, go to *Popular Science*.

Los Angeles Times SECRETS OF A SUPERNOVA



The NuSTAR high-energy X-ray observatory captured this image of Cassiopeia A, a remnant that blew up as a supernova more than 11,000 years ago, leaving a dense stellar corpse and its ejected remains.

Staring into the dramatic corpse of a dead star known as Cassiopeia A, astronomers using NASA's Nuclear Spectroscopic Telescope Array (NuSTAR) telescope have for the first time mapped out radioactive titanium in a supernova. Lawrence Livermore scientists helped build the telescope and are part of the team analyzing its findings.

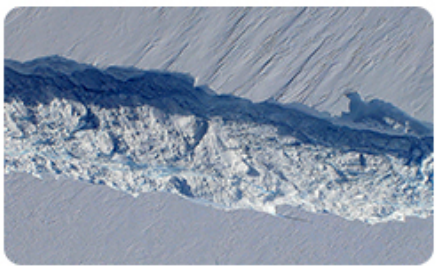
The findings reveal how shockwaves likely rip apart massive dying stars, and ultimately end their lives.

A supernova is the cataclysmic death of a star, which is extremely luminous and causes a burst of radiation that often briefly outshines an entire galaxy before fading from view. The explosion expels much or all of a star's material at a velocity of 10 percent of the speed of light, driving a shockwave into the surrounding interstellar medium. This shockwave sweeps up an expanding shell of gas and dust called a supernova remnant, like Cassiopeia A.

To read more, go to the *Los Angeles Times*.

myScience

ON THIN ICE



Lawrence Livermore research shows that the Pine Island Glacier's recent melt may go on for decades or centuries.

New research shows that a glacier of the West Antarctic Ice Sheet may continue thinning for decades to come, according to Lawrence Livermore scientists and colleagues from the UK and Germany.

Pine Island Glacier, a major outlet of the West Antarctic Ice Sheet, which is rapidly accelerating, thinning and retreating, has thinned rapidly before. The team said their findings demonstrate the potential for current ice loss to continue for several decades or even centuries.

The new research shows that this same glacier also experienced rapid thinning about 8,000 years ago.

To read more, go to *my science*.

COMPUTERWORLD An IDG company

IF IT SHEDS LIKE A SNAKE

Lawrence Livermore researchers are developing highly breathable membranes that are surface modified with a chemical warfare agent-responsive functional layer.

Scientists at Lawrence Livermore are using nanotechnology to create clothing designed to protect U.S. soldiers from chemical and biological attacks.

The researchers turned to nanotechnology to overcome the tough task of creating military-grade protective clothing that's breathable and isn't heavy to wear.

"The threat is nanoscale so we need to work in the nano realm, which helps to keep it light and breathable," said Francesco Fornasiero, a staff scientist at the Lab. "If you have a nano-size threat, you need a nano-sized defense."

The Lawrence Livermore team isn't taking just one track to make that happen. They're working on at least two different options for the carbon nanotubes. One of the materials would shed like a snakeskin upon coming into contact with a chemical agent.

To read more, go to *Computerworld*.
